

WHAT IS CLAIMED IS:

1. A biofilter media comprising a plurality of grains, each grain comprising:
  - a porous hydrophilic nucleus; and
  - a hydrophobic coating on said hydrophilic nucleus, wherein said hydrophobic coating comprises:
    - a metallic agent;
    - microorganisms;
    - nutrients;
    - organic carbon;
    - an alkaline buffer;
    - a bonding agent;
    - an adsorptive agent; and
    - a hydrophobic agent.
2. A biofilter media according to claim 1, wherein said hydrophilic nucleus comprises porous low-density aggregate.
3. A biofilter media according to claim 2, wherein said porous low density aggregate is produced by gas expansion at temperatures exceeding 1100°C.
4. A biofilter media according to claim 1, wherein said metallic agent comprises at least one metal selected from the group of iron, manganese, nickel, copper, titanium or a similar metal from the transition element group having similar properties.

5. A biofilter media according to claim 1, wherein said metallic agent comprises iron.
6. A biofilter media according to claim 1, wherein said metallic agent is in powdered form prior to formation of said hydrophobic coating.
7. A biofilter media according to claim 1, wherein said adsorptive agent and said hydrophobic agent comprise clinoptilolite.
8. A biofilter media according to claim 7, wherein said adsorptive agent and said hydrophobic agent further comprise activated carbon.
9. A biofilter media according to claim 1, wherein said microorganisms are provided by including a source of inoculation.
10. A biofilter media according to claim 1, wherein said microorganisms comprise microorganisms selected from *Thiobacillus (T) thioparus*, *beggiatoa*, *thiothrix* genera, and *T. feroxidants*.
11. A biofilter media according to claim 1, wherein said microorganisms, nutrients and organic carbon are provided by one or more of peat, compost or a coarse wood-based material.
12. A biofilter media according to claim 1, wherein said nutrients comprise phosphorus, nitrogen and potassium.
13. A biofilter media according to claim 9, wherein said source of inoculation comprises microorganisms and a nutrient source.
14. A biofilter media according to claim 9, wherein said source of inoculation is a standard laboratory bacterial growth medium containing microorganisms.
15. A biofilter media according to claim 14, wherein said standard laboratory bacterial growth medium is agar or broth.

16. A biofilter media according to claim 1, wherein said alkaline buffer may be selected from the group comprising silicates, fly ash or similar alkaline material.
17. A biofilter media according to claim 1, wherein each said grain has a size of approximately between 2 and 25 (mm) millimeters.
18. A biofilter media according to claim 1, which is operable to remove hydrogen sulfide at a range of pH levels from approximately 2 to approximately 7.
19. A biofilter media according to claim 1, which is operable to remove hydrogen sulfide within approximately 24 hours of start-up.
20. A biofilter system comprising:
  - a housing;
  - an inlet provided to said housing for receiving contaminated air;
  - an outlet provided to said housing for exhausting cleaned air; and
  - a biofilter media situated between said inlet and said outlet through which said contaminated air flows, wherein said biofilter media comprises:
    - a porous hydrophilic nucleus; and
    - a hydrophobic coating on said hydrophilic nucleus, wherein said hydrophobic coating comprises:
      - a metallic agent;
      - microorganisms;
      - nutrients;
      - an organic carbon source;
      - alkaline buffer;

a bonding agent;  
an adsorptive agent; and  
a hydrophobic agent.

21. A biofilter system according to claim 18, further including a water delivery system.

22. A method of operating a biofilter system, said biofilter system comprising a housing and a biofilter media, said method comprising:

monitoring a temperature of said biofilter media;

selectively heating an air stream flowing through said biofilter media or irrigating said biofilter media based on said monitoring to maintain said temperature within a predetermined range.

23. A method of operating a biofilter system according to claim 22, further comprising:

monitoring air pressure within said housing; and

selectively heating an air stream flowing through said biofilter media or irrigating said biofilter media based on said pressure monitoring to maintain said pressure within a predetermined pressure range.

24. A method of operating a biofilter system according to claim 22, wherein said heating of said air stream comprises delivering steam to said air stream.

25. A method of operating a biofilter system according to claim 22, wherein said irrigation further comprises the addition of nutrients, inoculums and alkaline buffers.